

PECULIAR FEATURES OBSERVED ON SURFACES OF PLAGIOCLASE CRYSTALS FROM THE ROCK 15076,55.

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During our single crystal X-ray diffraction studies of samples from the rock 15076,55 peculiar features were observed on the surfaces of An-rich plagioclases, on which the authors have briefly reported (1). The details of the mound-shaped peculiarities and their genesis could not yet be interpreted satisfactorily. Similar phenomena have been reported and attempts have been intensively made on the interpretation of their genesis (2 - 6). Laboratory simulations have just started in order to interpret the phenomena (7). However, the peculiarities presented in this report are considerably different in detail from those reported so far on lunar samples (2 - 6), and those observed in laboratory (7).

In spite of careful investigation of the rock 15076,55 only two plagioclase crystals showing the peculiarities in question have been found. They were found in vugs of the rock, and differ appreciably from feldspar crystals in the bulk material with respect to their well developed faces; and they are untwinned. These facts apparently indicate that they have grown in the presence of vapor phase.

The anorthite contents of the crystals were optically determined and are found to be An 85 ± 3 Mol %. The peculiar features on the surface (010) of the crystal No. 2 are studied by means of scanning electron microscopy (SEM). Some pictures of these microscopical studies are presented in Fig. 1 - 8. Results of energy dispersion X-ray analysis (EDAX) have been given previously (1).

From their morphological features pillars in area 1 (central circular mound) are supposed having grown in an impact-produced vapor phase and resemble whiskers. However, because of their extremely small sizes it is not possible to ascertain their chemical and physical natures. The needle crystals in the marginal zone of the area 1 could not yet be indentified crystallographically. Fig. 7 indicates that the needle crystals in this part were generated earlier than the pillars. Elements of the area 1 detected by EDAX are Si in medium, P (or Zr, or both of them) in medium, Ca in predominant contents, Ti and Fe in small contents.

Area 2 (the area between the area 1 and the outer circles) is, because of her homogeneous flat surface, most probably a thin layer of silicate glass on the plagioclase substrata. Elements of the area 2, considerably different from those of the area 1, are Al in small, Si in predominant, and K in small contents.

The concentric ripple texture shown in Fig. 8, corresponding to the outer circles at lower magnification, suggests that the peculiar features may result from splashing of molten material, produced by meteoritic impacts on a partially liquid surface. Elements of area 3 (outside of the circles) are Al in medium, Si in predominant and Ca in

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medium contents, and they correspond to those of an An-rich plagioclase.



Fig. 1



Fig. 2

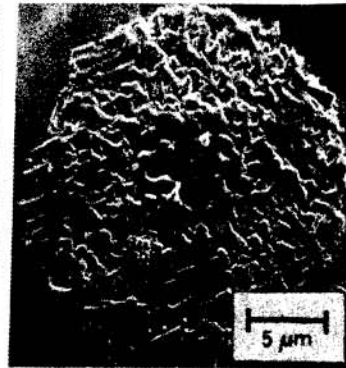


Fig. 3

- Fig. 1 - Oblique view of the mound-shaped peculiarities on the surface (010) of an An-rich plagioclase. Note the concentric circles ~70μm max. diameter. Square patches are traces of EDAX.
- Fig. 2 - Peculiarities at higher magnification. Note pillars of different lengths on the mound (area 1). The zone between the mound and the outer circles is very flat.
- Fig. 3 - Top view of the mound (area 1). At the margin of the mound (area 1) needle crystals are observed, some of them interpenetrating each other (center left portion). The frequent observation of 120° angles indicates a threefold symmetry of intergrowth (see bottom of the figure).



Fig. 4



Fig. 5



Fig. 6

- Fig. 4 - Enlarged view of a cone-shaped pillar (whiskers?); on top of which 4 needles are recognized.
- Fig. 5 - Oblique view of the cone-shaped pillar in Fig. 4 and the neighboring area. Note pillars in different sizes, cf. Fig. 7.
- Fig. 6 - Top view of the crystalline part of the mound (area 1) at higher magnification, cf. Fig. 3.

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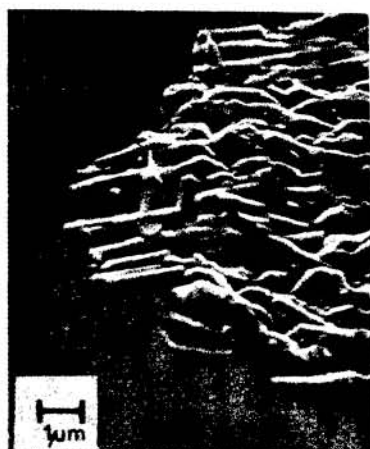


Fig. 7



Fig. 8

Fig. 7 - Oblique view of the same part of Fig. 6. Note small pillars on needle crystals. One of them is indicated by an arrow.

Fig. 8 - Top view of the outer circles at higher magnification, cf. Fig. 1 and Fig. 2. Note the concentric ripple texture between area 2 (inside) and area 3 (outside).

References

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